Cite this as: Zhaolu WANG, Jinjin YANG, Xiaohui SUN, Xi SUN, Gongshe YANG, Xin'e SHI. Exosome-mediated regulatory mechanisms in skeletal muscle: a narrative review[J]. Journal of Zhejiang University Science B, 2023, 24(1): 1-14. http://doi.org/10.1631/jzus.B2200243

Exosome-mediated regulatory mechanisms in skeletal muscle: a narrative review

Key words: Exosome; Skeletal muscle; Muscle atrophy; Insulin resistance

Research Summary

This review mainly focused on recent research progress in exosomal isolation, characterization and mechanism of action, and emphatically discuss current advances in exosomes derived from multiple organs, tissues, and engineered exosomes regarding the regulation of physiological and pathological development of skeletal muscle.

Innovation points

- **Introduction of the recent research progress of exosomal isolation, characterization and mechanism of action.**

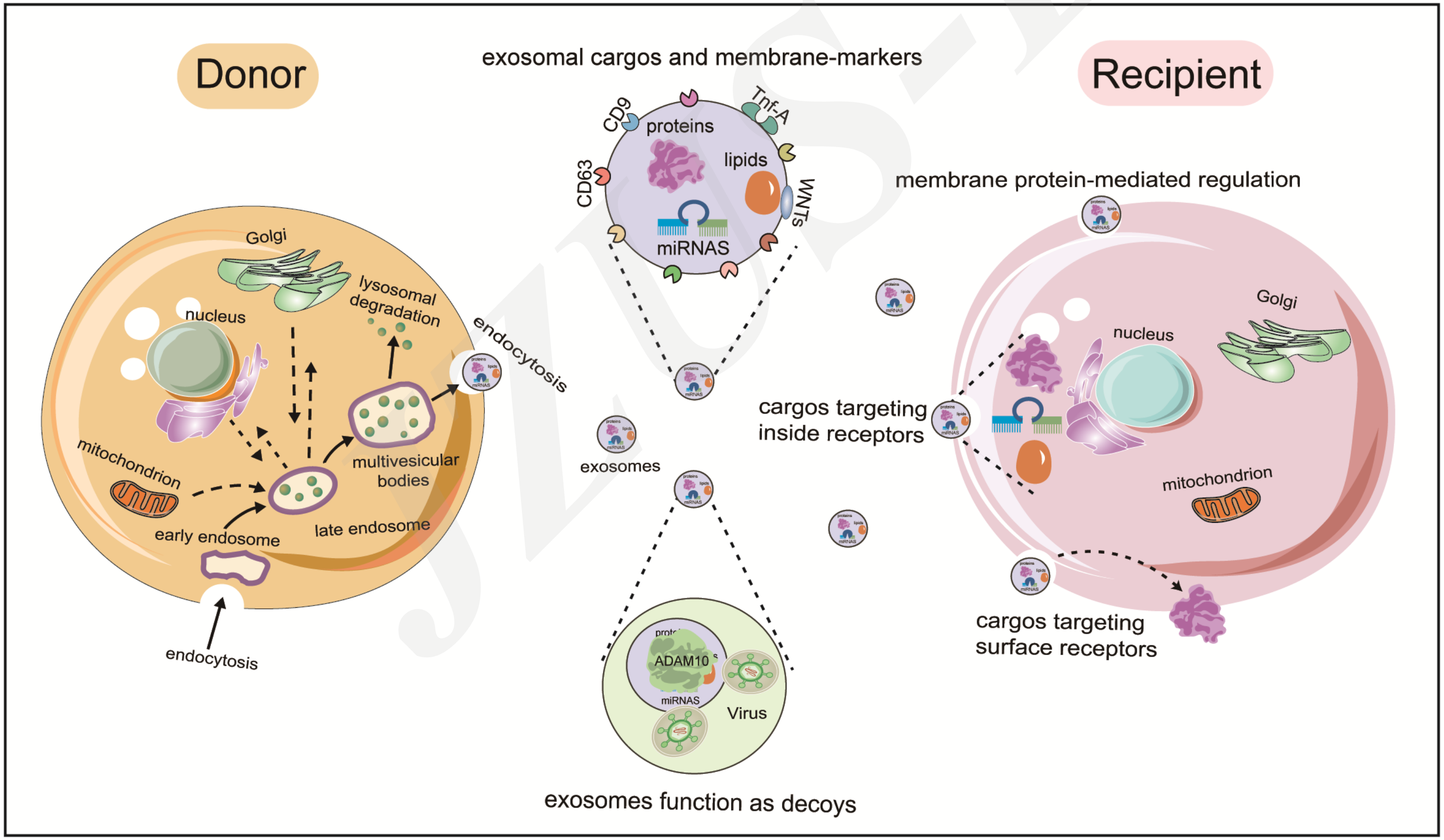

Fig. 1

Innovation points

- **A comprehensive tables were generated to summary of the current advances in exosomes derived from multiple organs, tissues and and engineered exosomes regarding the regulation of physiological and pathological development of skeletal muscle.**

Table 1

Origin	factor(s)	Functions	Target	Reference
Myogenic progenitor cells	miR-206	Inhibits collagen biosynthesis to ensure optimal muscle remodeling	RRBP1	Fry et al., 2017
Hindlimb muscle	let-7-5p	Increases protein synthesis	IGF-1	Huang et al., 2021
Adipocyte	miR-27a	Induces insulin resistance	PPARγ	Yu et al., 2018, Wang et al., 2022
Gonadal white adipose tissue	miR-222	Promotes obesity-associated insulin resistance and glucose intolerance	IRS1 and p-AKT	Li et al., 2020
Adipose tissue macrophage (M1)	miR-155	Causes glucose intolerance and insulin resistance	PPARγ	Ying et al., 2017
Bone marrow-derived macrophages (M2)	miR-690	Improves glucose intolerance and insulin sensitivity	Nadk	Ying et al., 2021
Adipose tissue macrophage (M1)	miR-29a	Causes insulin resistance	PPARδ	Liu et al., 2019
Serum	miR-20b-5p	Impairs insulin action in human skeletal muscle	AKTIP and STAT3	Katayama et al., 2019
Oral squamous cell Carcinoma cells	miR-181a-3p	Induces muscle cell atrophy and apoptosis	unspecified	Qiu et al., 2020
C26 cell-induced colon cancer	miR-195a-5p and miR-125b-1-3p	Induces skeletal muscle wasting	Bcl-2	Miao et al., 2021
C26 cells	GDF-15	Induces skeletal muscle atrophy	Bcl-2/caspase-3	Zhang et al., 2022
Umbilical cord mesenchymal stem cell	unspecified	Ameliorates blood glucose levels and partially reverses IR	GLUT4	Sun et al., 2018
Placenta-derived mesenchymal stem cell	miR-29c	Promotes differentiation of myoblasts	unspecified	Bier et al., 2018
Umbilical cord mesenchymal stem cell	circHIPK3	Prevents pyroptosis and repair ischemic muscle injury	miR-421/FoxO3a	Yan et al., 2020
Bone marrow mesenchymal stem cell	unspecified	Facilitates recovery after injury	TGF-β	Iyer et al., 2020
Bone marrow mesenchymal stem cell	miR-486-5p	Inhibits dexamethasone-induced muscle atrophy	FoxO1	Li et al., 2021
Adipose tissue-derived mesenchymal stem cell	unspecified	Attenuates the damage of biopsy punch to muscle bundles	MYOG/MYOD	Byun et al., 2021
Muscle-derived fibroblasts	miR-199a-5p	Promotes skeletal muscle fibrosis	Caveolin-1	Zanotti et al., 2018
Engineered HEK293 cells	miR-26a	Ameliorates muscle wasting	FoxO1	Zhang et al., 2019
Engineered bone marrow mesenchymal stem cells	miR-215	Protects skeletal muscle against injury	FABP3	Zhou et al., 2021
Engineered C2C12 cells	Hsp60	Ameliorates muscle wasting and cachexia	PGC-1α isoform 1	Di Felice et al., 2022
Engineered human bone marrow mesenchymal stromal cells	IL6ST	Partially ameliorates IL6/IL6R complexes-induced anti-differentiation effects	STAT3	Conceição et al., 2021

Innovation points

- **Emphasis of the potential clinical applications of engineered exosomes.**

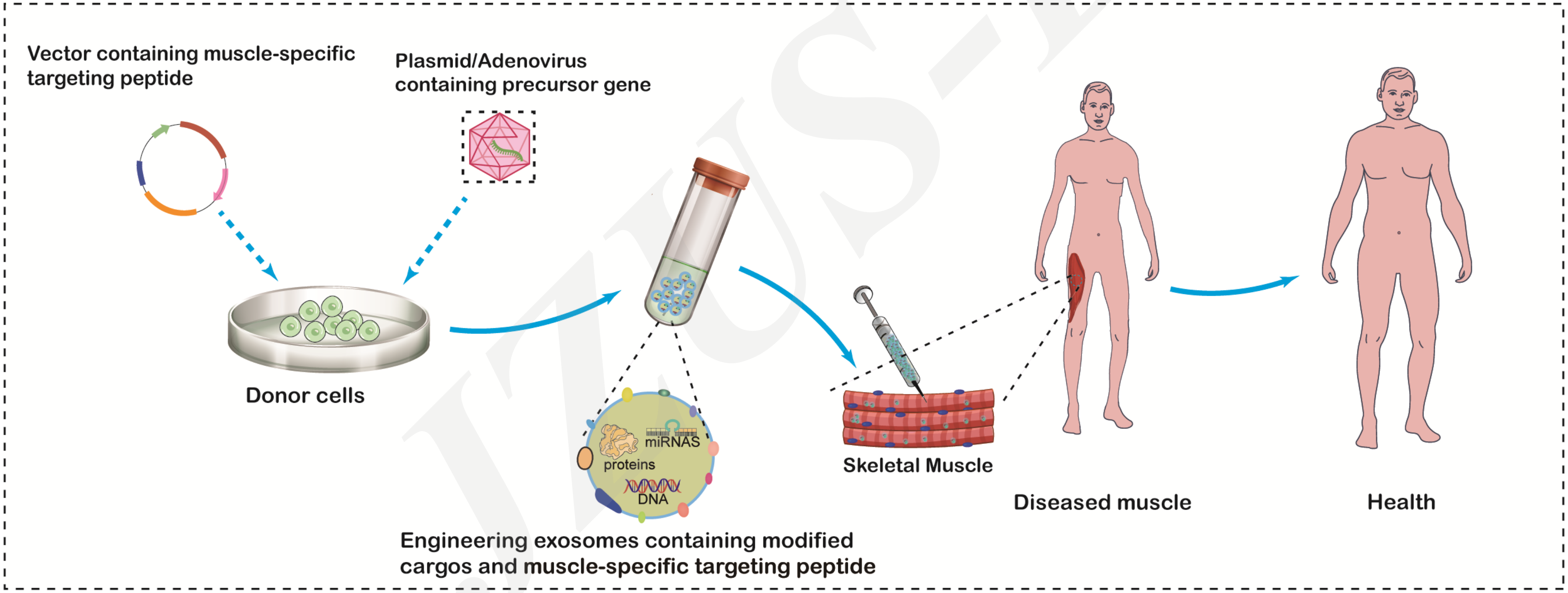

Fig. 2